(11)

COMMONWEALTH OF AUSTRALIA

PATENT SPECIFICATION (21) 2598/66

Class (52) 32.6; 11.3; 59.6.

Int. Cl. (51) B07b; A01f; B65g.

Application Number (21) 2598/66.
Lodged (22) 8th March, 1966.
(Accompanied by a Provisional Specification)

Complete Specification entitled (54) AN IMPROVED SCREENING MECHANISM.

Lodged (23) 8th March, 1967.
Accepted (44) Lapsed Section 53.
Published (41) 12th September, 1968.

Convention Priority (30)

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Related Art (56)

278281(28098/63)	32.6; 50.9.
275627(23449/62)	32.6; 25.8.
273171(21481/62)	32.6; 59.6.

The following statement is a full description of this invention, including the best method of performing it known to us :

L63-89-2D-22P.C.

THIS INVENTION relates to an improved screening mechanism.

Sieves or riddles of harvesting machines have the disadvantage that they tend to become clogged with impurities such as broken heads of wheat, pieces of straw and flag, wild oats with its barbed and awned seed, awns of wheat or barley, and so on. Consequently it is necessary for such sieves to be inspected regularly and, if they shown signs of clogging, that they be cleaned, which may involve removing them from the implements to which they are fitted. It will be appreciated that when clogging of such a sieve occurs the efficiency of the blast from the fan used to direct air through the sieve is impaired, so that there is a greatly increased likelihood of chaff and short straws passing with the grain into the grain box of the implement, and also of grain being carried to the back of the sieve and thrown over the tailflap and so wasted.

With existing sieves, it is found that with the clogging that is likely to occur, and even without any clogging, a significant proportion of grain is likely to be carried with chaff over the back of the sieve and to fall with the headings into the conveyor which returns it to the threshing drum which, particularly in hot weather, is very likely to lead to cracking of the grain. Excess cracked grain in a sample, of course, leads to downgrading of the grain, and consequent loss to the farmer. A further source of loss due to sieves of unsatisfactory efficiency results from the inclusion of undue percentage of foreign matter in the grain.

The present invention has been devised to

overcome these and other existing disadvantages, and it has for its principal object the provision of a screening mechanism, applicable to harvesting machines but also having other applications such as in feed to silos and in grain drying machinery, which is particularly efficient in operation and not liable to clogging.

Broadly, the invention resides in a screening mechanism including a frame, a plurality of rollers mounted rotatably on the frame in spaced substantially parallel relationship, and means for rotating the rollers simultaneously in the same direction. The screen may be of flat type, or of cylindrical type, the rollers, in the latter case, being spaced equidistantly from the horizontal or nearly horizontal axis of the screen. The rollers are preferably made with outwardly extending peripheral flanges, and preferably the flanges of one roller extend for some distance between the flanges of th next. The flanges may be concentric with the roller, or eccentric, and they may be plain or serrated. Other features of the invention will become apparent from the following description.

Exemplary embodiments of the invention will be described with reference to the accompanying drawings, in which:-

FIGURE 1 is a somewhat diagrammatic side elevation of a machine incorporating a screening mechanis according to the invention,

FIGURE 2 is a plan view of part of a screen for use in the machine of Figure 1,

FIGURES 3 to 8 show various alternative forms of roller.

Referring to FIGS. 1 and 2, a screening mechanism, particularly for grain, but usable for other

materials, includes a screen 10 having a substantially rectangular frame 11 in which are set a number of parallel transverse rollers such as 12, 13, 14 (Fig. 2). Each of these rollers is in the form of an axially elongated cylinder 15 mounted on a co-axial axle 16 and with a series of equally spaced peripheral flanges extending therefrom. Each roller assembly may be made up of a number of short cylinders axially apertured to fit on the axle 16, and alternating with centrally apertured discs 17, the cylinders and discs being held against rotation on the axle as by a keyway. The rollers are so arranged that their discs 17 intermesh, that is to say each alternate roller such as 12 and 13 are so arranged that the discs 17 of one closely approach the cylinder 15 of the other, the intermeshing or interfitting discs 17 of the two rollers being equally spaced apart.

Means are provided for rotating the rollers of screen 10 in the one direction, and to this end the roller axles 16 of the screen carry similar sprockets 18 outwardly of one side of the screen frame 11, and all of the sprockets 18 are engaged by an endless chain 19, idler sprockets such as 20 being provided as required to ensure a good drive. One of the roller axles 16 also carries a drive pulley wheel 21.

Screen 10 is so mounted as to incline upwardly towards one end, (to the right in FIG. 1), hereinafter referred to as the rear end of the screen. Means of any suitable character may be provided for adjustably varying this inclination of the screen.

There is provided a belt drive, operable by any suitable source of power, (such as an electric motor E) to engage the drive pulley 21 of the screen,

to rotate simultaneously all of the rollers 12, 13, 14 in such direction that the upper part of each roller moves towards the rear end of the screen of which it forms a part.

Mounted above the front end of screen 10, is a grain hopper 22, adapted to receive a quantity of grain to be cleaned, its sides converging downwardly to an outlet at which there is provided a suitable grain release shutter 23, means being provided for opening or closing the outlet by means of this shutter. Grain in hopper 22 may thus be fed at a controlled rate from the outlet onto the lower or front end of screen 10.

Associated with the screen 10 is a fan blower 24, with an exhaust conduit 25 directed obliquely upwards and rearwards under screen 10. Mounted under the front end of screen 10, is a waste chute (not shown) which is adapted to receive any material dropping through the screen.

Beneath the rear end of screen 10 there is mounted a grain discharge chute 27, adapted to receive any material dropping through the screen at this end and to convey it down to a grain receptacle 28.

In use, grain which has been introduced into the grain hopper 22 is fed therefrom at a controlled rate to the front end of the screen 10, the drive operating to actuate all of the working parts of the mechanism. The rollers 12, 13, 14 of the screen are rotated at a speed which may be, for example, about 250 R.P.M. The grain fed onto the screen, is rapidly spread by the revolving rollers, and the lighter and coarser foreign matter mixed with the grain is carried along towards the rear or discharge end of the screen,

assisted by the air blast from the blower.

The rollers above the waste chute are very closely spaced so that fine material, such as dust, cracked grain, and fine weed seeds, if not blown away by the fan 24, passes through and is carried away via the waste chute.

The rollers above grain discharge chute 27 are spaced to allow whole grain to pass through, but to reject larger solid material, which is therefore discharged over the rear end of screen 10 as indicated by arrow 29.

Thus fine material is separated by fan 24 and the front rollers of screen 10, coarse material is passed over the rear end of the screen, and the whole grain with very little rubbish falls through the rear end of the screen to discharge chute 27 and grain receptacle 28.

Where coarse grain such as maize is being treated, a third section of screen 10 with even wider spacing may be provided, so that finer waste is separated in the first two sections and the larger grain passes through the third.

Alternatively, two screens of the general type of screen 10 may be mounted one below the other, so that material passing through the first screen, which is coarser, is introduced onto the front end of the second screen, coarse material being separated in both screens and fine material being carried away by the fan from both screens. Whole grain passes to a hopper through the second screen.

Where the screening mechanism is built into a header or harvester, the header output is fed direct to the screen 10, hopper 22 being dispensed with.

In this case a considerable amount of straw is put onto screen 10. This may be handled advantageously by the front few rollers being of a form shown in FIGS. 5 or 6. Here the discs 30 are peripherally-toothed at 31, the teeth 31 being formed in saw-tooth shape, but rotated, as indicated by the arrows, with the sloped faces of each saw-tooth leading. Such discs pass straw-like material rapidly along the screen and prevent clogging, while treating smaller material in much the same way as the circular discs previously described.

FIG. 6 shows the disc 30 eccentric to axle 16. Where such eccentric discs are used (~~whether the discs are saw-toothed, circular, elliptical or otherwise~~) the angular setting of successive discs on an axle 16 may be changed by equal amounts from disc to disc, as shown in FIG. 7, so that the rollers of a screen give a ~~tossing~~ motion.

The rollers themselves may be variably spaced instead of equally spaced, the discs being suitably varied in diameter.

The discs may be of various other forms.

For example, they may taper towards their peripheries 32 as shown in FIG. 4 either by being formed lenticularly and spaced by spacer discs 33 (as shown) or by turning deep V-grooves in an integral roller cylinder. The provision of spacers 33 is particularly advantageous in treating larger grain.

Alternatively, each disc may consist of two dished halves face-to-face to give the peripheral taper. The slant faces of these discs may be formed with slight radial corrugations.

Again, a roller may be formed by a substantially cylindrical element in which a deep screw

thread has been formed (FIG. 3), the lands of the thread then forming the equivalents of the discs.

On the other hand, the rollers may have more or less radial pockets or recesses 34 in their surface, as shown in FIG. 3, discs being omitted.

The first few rollers at the front end of screen 10 may with advantage be of the form having a peripheal taper to their discs (FIG. 4) the discs of one roller lying between those of the next with small clearance. This gives a strong horizontal movement to material passing along screen 10 and assists in removing short straw and awns with the aid of fan 24.

The invention is applicable to harvesting machines, or to stationary machines for cleaning or grading grain or other material.

In an alternative embodiment of the invention, a screen is of generally cylindrical, rather than flat, form. In this embodiment of the invention, rollers according to any of the types described above are arranged in substantially cylindrical form, equidistantly spaced from an axis of a screening chamber, which includes a frame in which the roller axles are rotatably mounted at or near their ends. The screening chamber frame is rotatable about its axis, which may be horizontal or nearly so, and means are provided for so rotating this frame, and for simultaneously rotating the rollers all in the same direction. For this purpose, there may be arranged at one end of the screen a fixed internal spur gear wheel which engages pinion wheels at this end of all of the roller axles. Means are preferably provided for adjustably diverging the rollers at the end of the screen remote from the internal gear wheel and pinion, for

grading seed of various crops.

Screening mechanisms according to the invention will be found to be very effective in achieving the objects for which the invention has been devised. The particular embodiments of the invention may, of course, be subject to many minor modifications of constructional detail and design, which will be readily apparent to skilled persons, without departing from the ambit of the invention herein claimed.

The claims defining the invention are as follows:-

1. A screening mechanism including a frame, a plurality of rollers mounted rotatably on said frame in spaced substantially parallel relationship, and means for rotating said rollers simultaneously in the same direction. (8 March 1966)

2. A mechanism as claimed in claim 1, in which said frame is flat. (8 March 1966)

3. A mechanism as claimed in claim 1, in which said frame is of cylindrical form, the rollers being spaced equidistantly from the substantially horizontal axis of said screen. (8 March 1966)

4. A mechanism as claimed in any prior claim, in which a roller has a series of outwardly-extending peripheral flanges or discs thereon, the flanges of adjacent rollers being interleaved. (8 March 1966)

5. A mechanism as claimed in claim 4, in which each flange of said roller is in the form of a flat disc, radial to the roller axis. (8 March 1966)

6. A mechanism as claimed in claim 5, in which the periphery of each disc is serrated in saw tooth form, and the direction of rotation is with the sloping faces of the saw-tooth serrations leading. (8 March 1966)

7. A mechanism as claimed in claim 4, in which each flange of said roller is radial and tapered towards its periphery. (8 March 1966)

8. A mechanism as claimed in any one of claims 4, to 7, in which said flanges are eccentric to the axis of said roller. (8 March 1966)

9. A mechanism as claimed in claim 8, in which the angular setting of successive flanges on said axis is changed by equal amounts. (8 March 1966)

10 A mechanism as claimed in claim 1, 2 or 3, in which a roller has a screw thread formed on the surface thereof. (8 March 1966)

11. A mechanism as claimed in claim 1, 2 or 3, in which a roller has a series of radial pockets or recesses formed in its surface. (8 March 1966)

12. A screening mechanism substantially as described with reference to FIG. 1 and FIG. 2 of the accompanying drawings. (8 March 1966)

13. A mechanism as claimed in claim 12, in which the rollers take the form shown in any one of FIGS. 3 to 7 of the accompanying drawings. (8 March 1966)

DATED this ninth day of March 1967.

JOSEPH DORRIS

by his Patent Attorneys,
[illegible]

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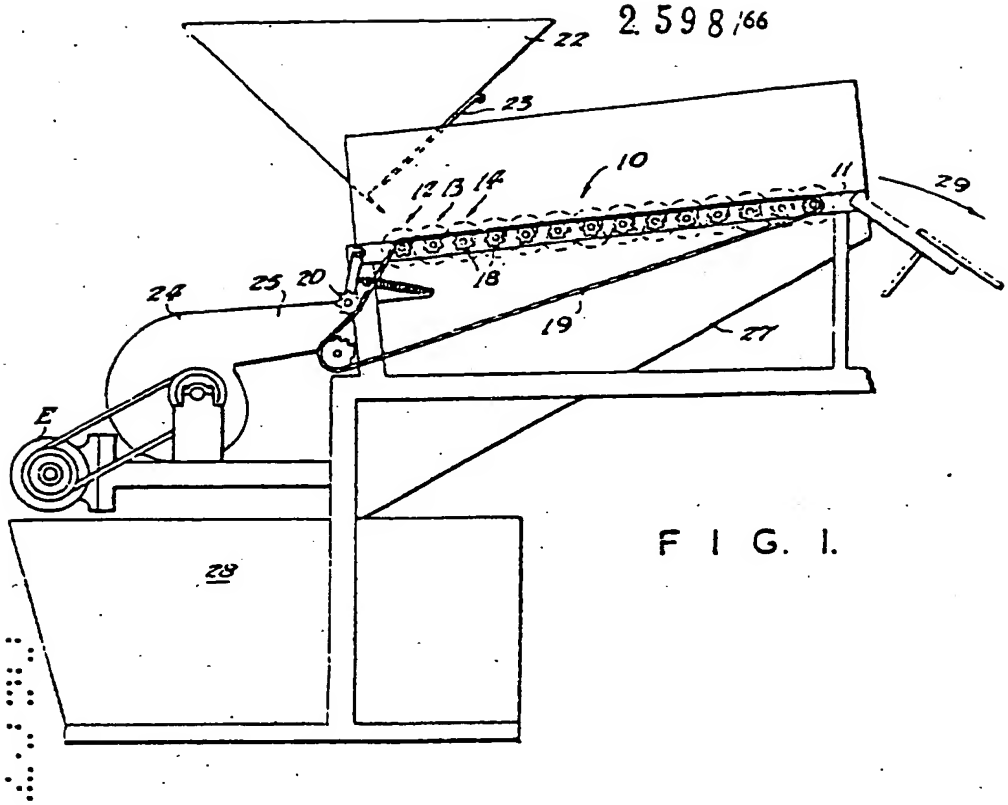

FIG. 1.

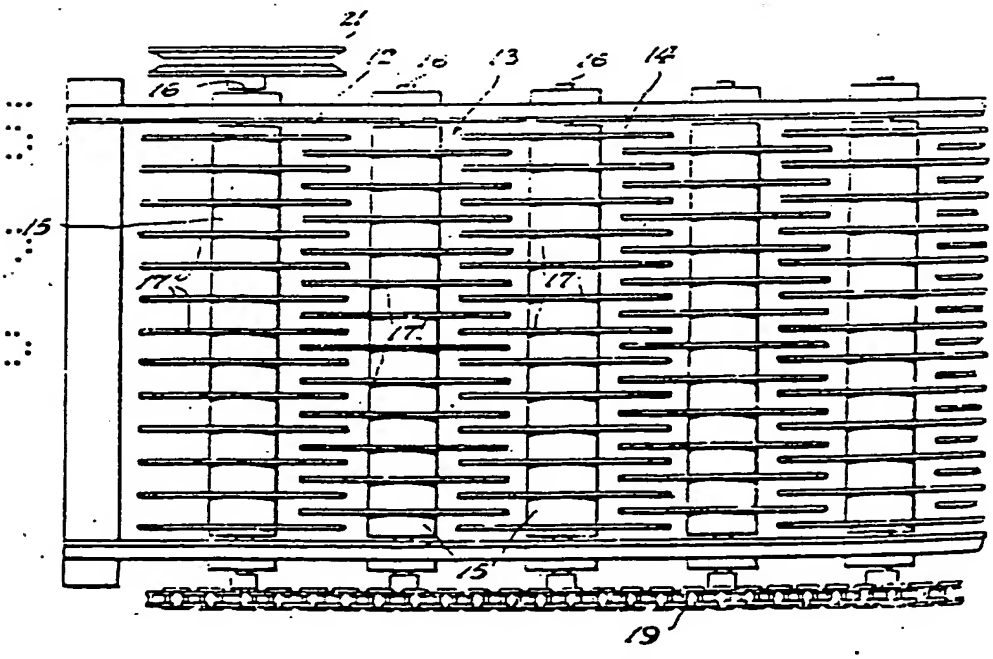

FIG. 2.

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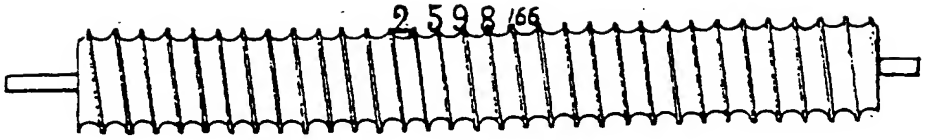
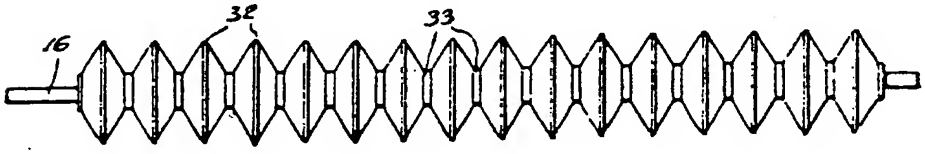


F I G. 3.



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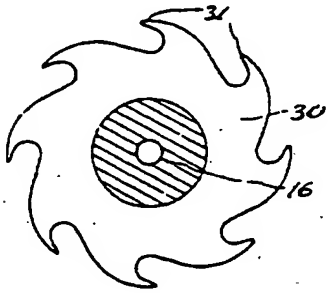

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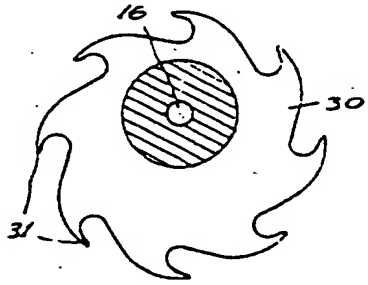

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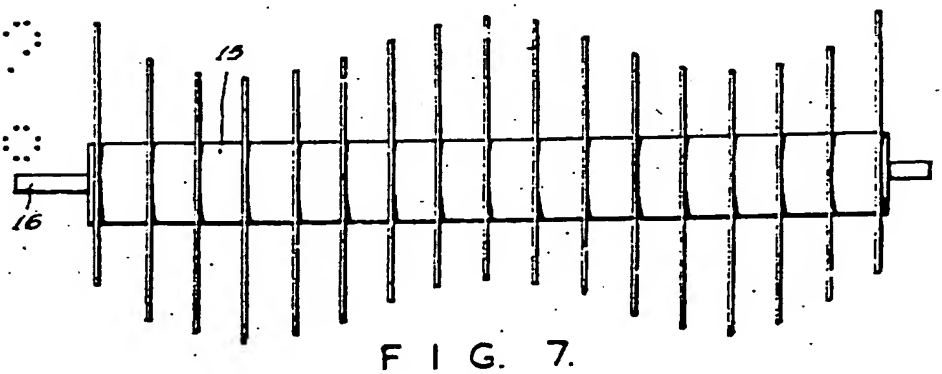
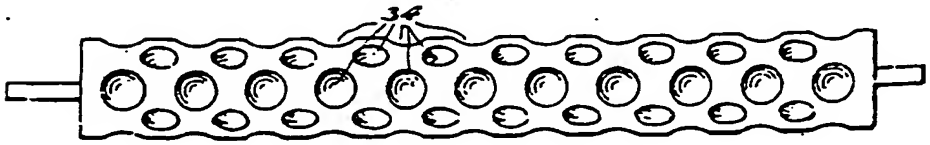


F I G. 7.



F I G. 8.

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